

AMENDMENT UNDER 37 C.F.R. § 1.111
Application No.: 10/713,256
Atty Docket No.: Q64625

REMARKS

The Office Action of December 15, 2004 has been received and its contents carefully considered.

Claims 1 to 14 are all the claims pending in the application.

Claims 2 to 14 have been rejected under 35 U.S.C. § 102(e) as anticipated by Ishida et al.

Applicants submit that Ishida et al do not disclose or render obvious the subject matter of claims 2 to 14 and, accordingly, request withdrawal of this rejection.

The present invention as set forth in claim 2 as amended above is directed to coated zinc oxide particles comprising zinc oxide particles and a metallic soap coated directly on the zinc oxide particles, wherein the coated zinc oxide particles are produced through the process according to claim 1. In claim 1, the zinc oxide particles coated with a metallic soap are produced by a process comprising mixing zinc oxide particles with a metallic soap at a temperature equal to or higher than a melting point of the metallic soap.

The present invention aims to provide coated zinc oxide particles exhibiting excellent dispersibility in resin; a thermoplastic resin composition endowed with excellent visible light transmission property and ultraviolet light shielding property; a molded product formed from the composition; and production processes for the particles, the composition, and the molded product. See page 4, lines 13 to 20 of the present specification.

In order to effect these purposes, the coated zinc oxide particles according to claim 2 have the following features.

(a) zinc oxide particles coated with a metallic soap are included;

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(b) the coated zinc oxide particles are produced through a process in which zinc oxide particles are mixed with a metallic soap at a temperature equal to or higher than a melting point of the metallic soap (the process of claim 1); and

(c) the metallic soap is coated directly on the zinc oxide particles.

According to feature (b), by an effect of treatment with the metallic soap in liquid form, the zinc oxide particles are uniformly coated with the metallic soap. See page 9, lines 3 to 6 of the present specification. According to features (a) to (c), dispersibility of the coated zinc oxide particles in resin can be greatly improved. See the Examples of the present specification.

For example, Example 1 of the present specification is directly comparable to Comparative Examples 3 and 4 of the present specification. In Example 1, the heating mixture temperature was 140°C, which was above the 120°C melting point of the zinc stearate. In contrast, in Comparative Examples 3 and 4, the heating mixture temperature of the zinc stearate was below 120°C. In Comparative Example 3, the heating mixture temperature was 100°C and in Comparative Example 4 there was no heating. Table 1 at page 20 of the specification shows that coated zinc oxide of Example 1 had improved dispersibility as compared to Comparative Examples 3 and 4, as evidenced by a smaller increase in pressure during melting kneading and a higher light transmittance at a wavelength of 550 nm. Accordingly, the present specification provides evidence that the process recitations that are incorporated into claim 2 result in a coated zinc oxide product that has improved dispersibility as compared to products which were not produced in accordance with the method recited in claim 1.

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In contrast to the object of the present invention, Ishida et al aim to provide zinc oxide particles which have suppressed surface activity and give safe and effective UV ray shielding ability to a variety of products. See column 3, lines 13 to 18 of Ishida et al. Therefore, the object of Ishida et al is different from that of the present invention which is to provide coated zinc oxide particles exhibiting excellent dispersibility in resin.

In Ishida et al, in order to attain the above object of Ishida et al, a cover layer of zinc silicate is formed on a surface of a zinc oxide particle, and thereby surface activity is suppressed. Ishida et al disclose, at column 11, line 66 to column 12, line 9, that after the formation of the zinc silicate coating on the surface of the zinc oxide particle, a metal soap layer can be coated. However, there is no description or suggestion in Ishida et al of features (b) and (c) of claim 2 of the present application. Especially, feature (c) that the metallic soap is coated directly on the zinc oxide particles is a significant difference.

Thus, although Ishida et al disclose that a metal soap can be coated on the zinc silicate coating, Ishida et al do not provide any disclosure of the temperature that should be used to mix the metallic soap with the zinc oxide (feature (b)), and do not disclose that the metallic soap is coated directly on the zinc oxide particles (feature (c)).

As described above, since the coated zinc oxide particles according to claim 2 are different from Ishida et al in their objects and features, and have original features that are not disclosed in Ishida et al, applicants submit that Ishida et al do not defeat the patentability of claim 2, or of claims 3 to 6 which depend on claim 2.

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Turning now to claim 7, which has been amended as set forth above to place it in independent form, it is directed to coated zinc oxide particles comprising zinc oxide particles and a metallic soap coated on the zinc oxide particles, wherein the zinc oxide particles have siloxane bonding on the surfaces thereof, and the coated zinc oxide particles are produced through the process according to claim 1.

The coated zinc oxide particles according to claim 7 have the following features for effecting the above purpose to provide coated zinc oxide particles exhibiting excellent dispersibility in resin.

(a) zinc oxide particles coated with a metallic soap are included;

(b) the coated zinc oxide particles are produced through a process in which zinc oxide particles are mixed with a metallic soap at a temperature equal to or higher than a melting point of the metallic soap (the process of claim 1); and

(d) the zinc oxide particles have siloxane bonding on the surfaces thereof.

According to feature (b), by an effect of treatment with the metallic soap in liquid form, the zinc oxide particles are uniformly coated with the metallic soap. See page 9, lines 3 to 6 of the present specification. According to features (a) to (c), dispersibility of the coated zinc oxide particles in resin can be greatly improved. See the Examples of the present specification, especially Example 6 where siloxane bonding was present on the surface of the zinc oxide particles. Furthermore, weather resistance of a resin containing the coated zinc oxide particles having siloxane bonding on the surfaces of the zinc oxide particles can be improved. See page 8, lines 12 to 15 of the present specification.

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In contrast, Ishida et al disclose zinc oxide particles which have a cover layer of zinc silicate on surfaces thereof and which can be surface-treated with a metallic soap. Further, an organopolysiloxane coating can be formed on the zinc silicate coating before the surface treatment with the metallic soap. See column 11, lines 40 to 54. Thus, in Ishida et al, the cover layer in contact with the zinc oxide is formed of zinc silicate (zinc orthosilicate, Zn_2SiO_4), and this zinc silicate is an ionic crystal in which SiO_4 ions, having a silicon atom and four oxygen atoms coordinated to the silicon atom in a regular tetrahedron structure, are arranged regularly, and zinc ions are located in gaps between the SiO_4 ions. Therefore, the zinc oxide particles of Ishida et al do not have siloxane bonding (Si-O-Si) on the surfaces thereof, and are different from the coated zinc oxide particles of claim 7.

Furthermore, the zinc oxide particles of Ishida et al have a cover layer formed of zinc silicate on the surface, and thereby when they are dispersed in a medium, the surfaces of the particles are completely masked or separated from the medium by the cover layer so that chemical reactivity to fatty acids is markedly reduced. See column 6, lines 55 to 64 of Ishida et al. Therefore, the cover layer of Ishida et al formed of zinc silicate is thought to be inferior in chemical reactivity to metallic soap (metal salt of fatty acid).

Also, in Ishida et al, as a method for coating metallic soap, a method in which a surface-treating agent is mixed with zinc oxide particles and then a resulting mixture is pulverized is disclosed. See column 12, lines 23 to 41. However, feature (b) of the present invention, that zinc oxide particles are mixed with a metallic soap at a temperature equal to or higher than a melting point of the metallic soap, is not disclosed in Ishida et al.

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Therefore, Ishida et al do not obtain the coated zinc oxide particles of the present invention in which zinc oxide particles are uniformly coated with metallic soap. The effect of the present invention that dispersibility of the coated zinc oxide particles in resin can be greatly improved is not obtained in Ishida et al.

As described above, since the coated zinc oxide particles according to claim 7 are different from Ishida et al in their objects, features, and effects, and have original features that are not disclosed in Ishida et al, applicants submit that claim 7 is patentable over Ishida et al.

Also, since a thermoplastic resin composition according to any one of claims 8 to 10 and a process for producing a thermoplastic resin composition according to claim 13 include the above coated zinc oxide particles of claims 2 or 7, applicants submit that claims 8 to 10 and 13 are patentable over Ishida et al.

Furthermore, since the molded product according to claim 11 or 12 and the process for producing a molded product according to claim 14 include the above thermoplastic resin composition of claim 8, applicants submit that claims 11, 12, and 14 are patentable over Ishida et al.

In view of the above, applicants submit that claims 2 to 14 are patentable over Ishida et al and, accordingly, request withdrawal of this rejection.

Claims 1 to 14 have been rejected under 35 U.S.C. § 103(a) as obvious over Ishida et al in view of EP '132 to Maeda et al.

Applicants submit that Ishida et al and EP '132 do not disclose or render obvious the present invention and, accordingly, request withdrawal of this rejection.

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In this rejection, the Examiner recognizes that Ishida et al do not disclose the method of forming the coating.

The Examiner cites EP '132 to Maeda et al for its teaching of a method of forming a coating of a metallic soap on titanium dioxide by heating the mixture of the titanium dioxide and the metallic soap at 70 to 200°C, as disclosed at page 4, lines 28 of EP '132. The Examiner notes that the melting point of metallic soap is below 200°C. The Examiner asserts that the EP '132 method, therefore, involves heat treating the metallic soap above its melting point to form a coating on titanium dioxide particles.

The Examiner argues that it would have been obvious for one of skill in the art to recognize that a method of coating metallic soap on titanium dioxide can also be used in the coating application of metallic soap on zinc oxide, because titanium oxide and zinc oxide are both metal oxides and both share many common physical characteristics that are both widely used in the art as inorganic pigments.

In response, applicants submit that EP '132 aims to provide a thermoplastic resin composition containing a titanium dioxide pigment, which is capable of forming a film or coating exhibiting a satisfactory surface state on paper, even when the concentration of titanium dioxide pigment in the thermoplastic resin composition is high. See page 2, lines 20 to 22 of EP '132. The titanium dioxide pigment is used as a white pigment.

In contrast, Ishida et al aim to provide zinc oxide particles which have suppressed surface activity and give safe and effective UV ray shielding ability to a variety of products. See column 3, lines 13 to 18 of Ishida et al.

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Therefore, EP '132 is very different from Ishida et al in its technical field.

Furthermore, in the Background of the Invention of Ishida et al, as a conventional inorganic UV-absorber, rutile titanium dioxide is described. Ishida et al disclose that this titanium dioxide is poor in transparency to visible light, and also inadequate in shielding against UV-A rays. See column 1, line 45, to column 2, line 7 of Ishida et al.

Therefore, applicants submit that one of ordinary skill in the art would not have been led to applying the teachings of EP '132, which involve conventional titanium dioxide, to the disclosure of Ishida et al. There is no suggestion to combine the teachings of Ishida et al with those of EP '132 to Maeda et al.

In addition, as discussed above in connection with the 102(e) rejection over Ishida et al, the present specification provides evidence that the use of a melting point above the melting point of the metallic soap leads to improved dispersibility with respect to the combination of zinc oxide and a metallic soap. EP '132 contains no disclosure or suggestion that improved dispersibility would be obtained by the use of a temperature above the melting point of the metallic soap, as opposed to a temperature below the melting point of the metallic soap, when a zinc oxide is coated.

In view of the above, applicants submit that claims 1 to 14 are patentable over Ishida et al and EP '132 and, accordingly, request withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

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Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

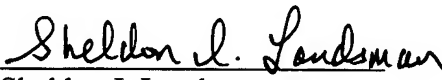
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23373

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